

MAGNETIC NON-LINEARITY CAUSED BY JAHN-TELLER DISTORTION CORRELATION IN MANGANITES

Michael D. Kaplan*, George O. Zimmerman****

*Chemistry and Physics Departments, Simmons College, 300 The Fenway, Boston MA 02115

**Physics Department, Boston University, 390 Commonwealth Ave., Boston, MA 02215

In the ferromagnetic and antiferrodistortive phase of the low doped colossal magnetoresistance manganites the magnetic moment is sharply increasing at some external magnetic fields. This non-linear behavior exists only at some temperature range and disappears at high enough and low enough temperatures.

We suggest that the explanation of this effect is related to the magnetoelasticity of the x-y ordered Jahn-Teller crystals. The magnetic field creates a magnetostriction crystal strain that is "turning on" (at $T > T_{JT}$) or enhancing (at $T < T_{JT}$) the molecular Jahn-Teller field caused by virtual phonon exchange. At the same time the Jahn-Teller distortion enhances the magnetostriction that forms electronic states supporting the magnetic moment.

The results of the calculations of the magnetic moment and of the magnetic susceptibility as a function of the external magnetic field and temperature are in qualitative agreement with the experiment. The hydrostatic and uniaxial pressure influence on the magnetic properties is considered in the framework of the developed microscopic model.